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Terrorism and trade*

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Abstract

This paper examines the effect of terrorism and warfare on international trade. We investigate bilateral trade flows between more than 200 countries over the period from 1960 to 1993. Applying an augmented gravity model that includes several measures of terrorism and large-scale violence, we find compelling evidence that terrorist actions reduce the volume of trade; a doubling in the number of terrorist incidents is associated with a decrease in bilateral trade by about 4 percent.

JEL classification: F15; F19

Keywords: Terrorism; Conflict; Warfare; Trade

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1. Outline

In this short paper, we examine the impact of terrorism and warfare on international trade. To identify the effect of terrorism on trade empirically, we apply a gravity model of trade and add several measures of terrorist activity, internal instability and external conflict. We find that violence strongly affects the pattern of trade; countries that are plagued by a larger number of terrorist attacks trade significantly less with each other than otherwise similar countries that do not suffer from terrorism. This finding is robust for a number of modifications, including a large and diverse set of alternative violence measures.

The remainder of the paper is in four parts. Section 2 discusses the association between terrorism and trade. Section 3 describes the empirical approach and the data. Section 4 presents the results, and section 5 concludes.

2. Discussion on terrorism and trade

A large and diverse body of literature (mainly in political science) has already documented the relationship between political variables and international trade. One line of research focuses on the impact of trade on political conflict. Polachek (1980), for example, argues that mutual trade dependencies diminish hostility and promote cooperation. Another line of research studies the impact of political factors on trade. Pollins (1989), for example, argues that diplomatic cooperation increases bilateral trade. Morrow, Siverson and Tabares (1998) find that trade flows are greater between countries with common interests and similar democratic institutions. Recent theoretical contributions that explore issues of the protection of property rights, security and trade include Grossman (2001) and Skaperdas and Syropoulos (2001). The empirical literature is surveyed, among others, in Barbieri and Schneider (1999) and Reuveny (1999-2000).

This paper is closely related to the literature that assesses the political determinants of international trade flows. In contrast to previous work, however, that mainly analyzes more general measures of conflict and political cooperation, we focus directly on terrorist activity and internal and external instability.

While the impact of terrorism on trade may vary across time and place, violence and warfare generally imply additional costs for transactions so that, if anything, we would expect a negative association between terrorist activity and the volume of trade. More specifically, there are at least three principal ways in which warfare may be a hindrance to international trade. First, terrorism leads to insecurity and thereby raises the costs of doing business. Buckelew (1984, p. 18) defines terrorism as "violent, criminal behavior *designed primarily to generate fear in the community*, or in a substantial segment of the community, for political purposes" (emphasis added). Depending on the dimension of terrorist attacks, people may become increasingly confused, get nervous, or feel generally less safe. For instance, after "18 months of random violence that has killed close to 400 citizens, injured thousands, and distressed millions, … the atmosphere in Israel [is] a mix of defiance and despair." (The Economist, March 30, 2002). The collapse of the twin towers on September 11, 2001 was a laming shock to the US economy, whose full impact remains to be measured. Terrorism may even lead to changes in a country's consumption and production patterns (e.g., Israelis now prefer malls instead of markets and walk in the streets instead of taking buses), thereby affecting the pattern of international trade. But terrorism-induced insecurity may also have a direct negative effect on trade. Since the economic impact of terrorist bombings and shootings are hardly predictable, existing business plans may quickly become obsolete so that firms generally face larger risks. Such insecurity may reduce the attractiveness of this market for international producers.

Second, the typical response to an increase in terrorist activity is an increase in security measures. Stronger security regulations, however, imply that trade becomes more

expensive, such as by increasing delivery times. For instance, after the terrorist attacks on September 11, 2001, US borders were temporarily closed; trucks on the border between Canada and the US had to wait up to 20 hours for a crossing that normally takes minutes.[1] El Al, Israel's airline, generally holds goods for a day for security checks (The Economist, September 22, 2001).

Third, there is the risk of a direct destruction of traded goods. While most terrorist attacks do not aim to cause direct economic damage, there is also a growing tendency to cripple countries economically. Terrorists target a country's trade because countries appear to be particularly vulnerable to the disruption of industry supply chains or the destruction of particular transport modes. For instance, according to the terrorism database of the US State Department (2002), there were not less than 178 bombings against a multinational oil pipeline in Colombia in 2001 alone.

Despite these clearly identifiable channels, the overall magnitude of the effect of terrorism on trade remains a priori unclear. In fact, it is even possible that terrorism has almost *no* measurable effect on trade since the overwhelming majority of terrorist actions are operations with only local implications. Also, terrorists rarely target freight directly and physical losses are, at least in principle, insurable.

In the next sections, we explore the association between terrorist activity and international trade empirically.

3. Methodology and data

Our empirical approach to identify the effect of terrorism on trade can be summarized as follows:

[1] For a detailed account of the impact of the terrorist attacks on September 11, 2001 on international trade, see Walkenhorst and Dihel (2002).

(1) $Trade_{ij} = \alpha + \beta\, Terror + \gamma \boldsymbol{Z} + \varepsilon$

where we regress (the log of) bilateral trade between countries *i* and *j* ($Trade_{ij}$) on our measure of terrorist activity (*Terror*) and a set of other conditioning variables $\boldsymbol{Z}$ that have the potential to affect the bilateral volume of trade, with ε being a well behaved residual.

The control variables in vector $\boldsymbol{Z}$ are borrowed from the gravity equation which is a long-established and empirically highly successful framework to model trade flows. Hence, our basic regression framework is fairly conventional:[2]

(2) $Trade_{ij} = \alpha + \beta\, Terror + \gamma_1\, D_{ij} + \gamma_2\, Y_i Y_j + \gamma_3\, Y_i Y_j / Pop_i Pop_j + \gamma_4\, Language$
$+ \gamma_5\, Border + \gamma_6\, Colonizer + \gamma_7\, Nation + \gamma_8\, Colony + \varepsilon$

where *D* is distance, *Y* is real GDP, *Pop* is population (all in natural logs), *Language* is a dummy that takes the value of one if *i* and *j* share a common language, *Border* is a common border dummy, *Colonizer* is a common colonizer dummy, *Nation* is a common nation dummy (e.g., for French overseas departments), and *Colony* takes the value of one if *i* colonized *j* or vice versa.[3]

Our data come from a number of different sources. The data for the dependent and the $\boldsymbol{Z}$ variables are taken from Glick and Rose (2002), who have constructed a comprehensive

[2] The approach is similar to other recent work in empirical international trade where augmented gravity models have been applied to identify the impact of regional trading blocs (e.g., Frankel, 1997), national borders (e.g., McCallum, 1995), and currency unions (e.g., Rose, 2000) on trade. More importantly for our purposes, this approach is also widely used in the political science literature to assess the impact of political factors on trade (e.g., Morrow et al., 1998).

[3] Note that our dependent variable is the total volume of bilateral trade so that we are unable to distinguish between an exporting and an importing country and our explanatory variables enter the regression jointly for country *i* and *j* (usually as a product). So, to be more precise, also our terrorism variable takes the form $Terror_i Terror_j$ In principle, however, one might

data set that covers (real) bilateral trade between 217 countries and territories between 1948 and 1997 and also provide information on all the other standard gravity variables.[4] To this data set, we add four types of controls for *Terror*. In a first exercise, we explore direct measures of terrorism; this is our main variable of interest. Raw data of terrorist activity are available from Mickolus (1980) who provides a detailed chronology of terrorist events around the world for the period from 1968 to 1979.[5] Mickolus (1980, p. xiii) defines terrorism as "the use, or threat of use, of anxiety-inducing extranormal violence for political purposes […] when such action is intended to influence the attitudes and behavior of a target group wider than the immediate victims and when […] its ramifications transcend national boundaries." The types of politically motivated incidents included in his data set are: kidnapping, barricade-hostage taking, occupation, letter bombing, incendiary bombing, explosive bombing, missile attack, armed attack, aerial hijacking, nonaerial takeover; assassination or murder, sabotage, exotic pollution, nuclear weapons threat, theft or break-in, conspiracy, hoax, sniping, shootouts with police and arms smuggling.

Based on this information, we construct three variables of terrorist activity: the yearly number of terrorist events, the total number of terrorist events between 1968 and 1979, and a dummy variable that takes the value of one for at least one terrorist action. Following Mickolus, we treat each incident equally; we do not distinguish between either the types of incidents or their severity or any other characteristic (such as the number of casualties).[6] It

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also make the case for braking up trade between exports and imports, allowing to explore whether terrorism has a greater impact in the exporting or the importing country.

[4] The data set is graciously provided by Andrew Rose on his website (http://faculty.haas.berkeley.edu/arose). In our actual analysis, we use different subsets of this large (>400,000 observations) panel data set according to the availability of data for our variable of interest.

[5] One of Mickolus's collaborators, Todd Sandler, has informed us that the published data for the years 1978 and 1979 may be incorrect. We have checked the robustness of our results and find that none of our results is affected when information for the last two years is excluded.

[6] Mickolus's (1980) data does not allow us to weight severity of terrorist incidents. Ideally, one would distinguish terrorist attacks by the amount of media coverage since many terrorists

should also be noted that Mickolus's data is on transnational terrorism. Mickolus (1980, p. xix) notes that: "[While] the bulk of politically violent incidents may occur in third world nations […], nearly half of all attacks are recorded in westernized democracies. Transnational attacks are very infrequent in Asia and Africa." Table 1 shows the five countries that, according to our measures, suffered most strongly from terrorism.

A second group of variables focuses on measures of internal instability other than terrorism. These measures include the number of politically motivated murders or attempted murders of high government officials or politicians (*Assassinations*); the number of any armed activities, sabotage, or bombings carried out by independent bands of citizens or irregular forces and aimed at the overthrow of the present regime (*Guerrilla activity*); the number of jailings or executions of political opposition within the ranks of the regime or the opposition (*Purges*); the number of violent demonstrations or clashes of more than 100 citizens involving the use of physical force (*Riots*); and the number of any illegal or forced changes in the top governmental elite, any attempt at such a change, or any successful or unsuccessful armed rebellion whose aim is independence from the central government (*Revolutions*). The original source for this information is Banks (1979), but the data are also available in an updated version from Easterly and Sewadeh (2002).

In a third set of controls, we analyze structural variables that aim to capture the extent to which a country's resources are devoted to the reduction of military conflicts. In particular, we use defense expenditures as a share of GDP (*Defense*) taken from the International Monetary Fund's Government Financial Statistics and the size of armed forces as a fraction of the country's total population (*Military*) obtained from Easterly and Sewadeh (2002). The idea is that, unless countries are outright aggressors, a larger share of resources spent on national defense should indicate a greater risk to internal and external threats.

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seek public attention; see Mickolus and Simmons (1997). Also, there is no separation between state sponsored terrorism and non-state sponsored terrorism.

Finally, we explore measures of external conflict. In this respect, Barro and Lee (1994) provide two variables that appear to be particularly appropriate to identify the impact of warfare on trade and are therefore used in our analysis: a dummy variable for countries that participated in at least one external war over the period 1960-1985 and the fraction of time over 1960-1985 each country was involved in an external war.

Descriptive statistics for the data and bivariate correlations are provided in the appendix.

4. Results

We begin our investigation by estimating equation (2), augmented with our measures of terrorist activity. The results are presented in Table 2. For the sake of completeness, we report the estimates on the entire set of regressors, but later we will focus exclusively on our variables of interest, since all coefficients on the standard gravity variables take the expected sign and are statistically and economically significant. For instance, trade increases with both higher GDP and higher GDP per capita (for the country pairing) and falls the greater the distance between two countries.

In a first exercise, we enter the (log interacted) number of terrorist attacks as (an additional) explanatory variable for the bilateral volume of trade. The estimated β coefficient is indeed negative and, with a t-statistic of about 6, statistically highly significant. The effect is also economically large; the point estimate of -0.04 implies that a doubling in the number of terrorist incidents (a rise by 100 percent) is associated with a decrease in bilateral trade by about 4 percent, holding all other things constant. This is in our view a very strong result since it implies that trade is already sizably reduced in the same (calendar) year in which a terrorist incident occurs.

In the next two columns of Table 2, we explore our two alternative measures of terrorist activity and find similar results. The coefficient on the (additively linked) dummy of

at least one terrorist action (that can take values of 0, 1, or 2) implies that the first terrorist incident in a country pair reduces bilateral trade by almost 10 percent; a pair of countries in which one country suffers from terrorist attack(s) trades only about 91 percent (exp[-0.10]=0.91) of what the two countries would trade if they were completely free from acts of terrorism. Also, replacing the number of terrorist actions per year with the total number of terrorist actions over a 12-year period has little effect on the results. The estimated β coefficient is even a bit larger, probably capturing the trade effects that are not visible already in the same year of an attack.[7] We have performed additional sensitivity analysis in order to establish the robustness of our results. For instance, we have dropped OECD countries. We have also analyzed different time periods separately. Our estimates were robust to these perturbations (as were all other findings reported in this paper).

To summarize, there is compelling evidence that terrorist activity negatively affect bilateral trade flows. Countries targeted by terrorism trade significantly less with each other than countries unaffected by terrorism.

In the following, we explore the effect of other measures of internal and external conflict on international trade. We begin with alternative measures of internal instability; results are reported in table 3. For each of the five main variables *Assassinations*, *Guerrilla activities*, *Purges*, *Riots*, and *Revolutions*, we follow our approach for the terrorism variable and construct three separate measures. A first measure gives again the number of relevant incidents for each year. As before, we consider this test to be very strong since a significant coefficient on this variable would imply that any additional incident has a measurable effect on trade already in the same year it occurs. A more reliable measure therefore might be the

[7] In unreported results, we find that the *total* number of terrorist actions is indeed the clearly dominant variable. If one enters the different terrorism measures jointly, only the estimate on the total number of attacks remains negative and statistically significant, though the results may suffer from multicollinearity. Nevertheless, this finding suggests that it is mainly the long-run average of terrorist activities that affects international trade rather than some brief periods of isolated attacks or the fact that a country has suffered any terrorist action.

average number of relevant incidents, our second variable. Finally, we have constructed frequency measures, based on the number of years in which relevant incidents have occurred.

In table 3, each line gives the results of a separate regression; the regressions include the full set of gravity variables, but, to save space, we report only the estimated β coefficient and some diagnostic statistics. Reviewing the results, *all* of the coefficient estimates on our internal instability measures are indeed negative and statistically highly significant. Thus, all kinds of domestic violence appear to sizably reduce trade, irrespective of whether it takes the form of assassinations, guerrilla activities, purges, riots, or revolutions. While we consider these results as particularly encouraging, the estimates appear to be unusually strong. Could it be that our variables, though different, finally capture various aspects of the same event? We can convincingly reject this hypothesis. The bivariate correlations (though consistently positive) are often quite low. Also, if one enters the different instability measures jointly, the estimated coefficients are all negative and statistically significant (results are available from authors on request).

In a next step, we explore two structural variables that should capture the potential risk of military conflict. Armed forces that make up a relatively large share of a country's total population as well as defense expenditures that represent a large fraction of GDP could both be indications of a country's higher propensity to conflicts and warfare (including terrorism). Our results appear in table 4. In line with our intuition, the relative size of the military has a negative effect on bilateral trade. The coefficient is statistically and economically significant, implying that countries with large armed forces trade significantly less with each other than otherwise similar countries with relatively small armies. For defense expenditures, however, the estimated coefficient is positive and also highly significant – a finding that survives extensive robustness checks such as including the (log product of the) land areas as additional explanatory variable or splitting the sample into OECD and Non-OECD countries. A potential explanation for this result is that large expenditures may indeed

provide better security. If both variables enter our regression jointly, the results are essentially unchanged from the default specifications.

Our final exercise aims to identify the impact of external conflict on trade. As shown in table 5, there is strong evidence that a country's participation in an external war reduces its volume of international trade. The estimated β coefficients are negative and statistically and economically significant. The most interesting result, however, is recorded in the final column of table 5. When estimated jointly, the coefficient on the fraction of time involved in external wars is (significantly) positive, suggesting that it is mainly the fact whether a country has ever participated in a war that matters and not the length nor the frequency of wars.

5. Summary

It is plausible to assume that terrorism and large-scale violence has a negative effect on international trade. Higher risks, additional security measures and direct destructions raise the costs for transactions and should thereby lower the volume of international trade. In this paper, we have presented evidence confirming this intuitive claim. Applying an augmented gravity model and analyzing bilateral trade flows between more than 200 countries over the period from 1960 through 1993, we find compelling evidence that terrorist actions reduce the volume of trade; this result is robust to alternative measures of political instability and military conflict. Our estimates suggest that a doubling in the number of terrorist incidents in a year is associated with a decrease in bilateral trade by about 4 percent already in the same year.

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Table 1
Description of Data on Terrorist Activity

Five countries that suffered most strongly from terrorism; Period: 1968-79

a) Number of Terrorist Actions

Country	Year	Number
United States	1975	41
United States	1976	35
United Kingdom	1974	34
Argentina	1973	34
Argentina	1976	33
France	1976	31
Argentina	1974	31
United States	1978	30
United States	1977	29
United States	1974	28
United States	1968	27
United States	1979	27
France	1975	27
Italy	1976	26
Argentina	1970	26

b) Total Number of Terrorist Actions

Country	Number
United States	288
Argentina	192
France	163
United Kingdom	149
Israel	135

c) Number of Terrorist Actions Per Capita

Country	Number
Lebanon	45,5
Israel	40,9
Cyprus	27,9
Djibouti	21,0
Barbados	20,6
OECD contries:	
Ireland	10,6
Greece	8,4
Switzerland	4,0
Netherlands	3,6
Belgium	3,3

Source: calculated from Mickolus (1980)

Table 2
The Impact of Terrorism on Trade

Dependent variable: (Log) Bilateral Trade Period: 1968-1979	(1)	(2)	(3)
(Log Product) 1+Number of Terrorist Actions	**-0.041**** **(0.007)**		
(Sum Dummy) At least one Terrorist Action, 1968-79		**-0.098**** **(0.018)**	
(Log Product) 1+Total Number of Terrorist Actions, 1968-79			**-0.065**** **(0.005)**
(Log) Distance	-1.054** (0.010)	-1.053** (0.010)	-1.055** (0.010)
(Log Product) Real GDP	0.804** (0.004)	0.800** (0.004)	0.825** (0.004)
(Log Product) Real GDP per capita	0.532** (0.006)	0.550** (0.006)	0.547** (0.006)
Common Language	0.315** (0.020)	0.312** (0.020)	0.320** (0.020)
Common Land Border	0.336** (0.047)	0.361** (0.047)	0.339** (0.047)
Common Colonizer	0.761** (0.031)	0.783** (0.031)	0.745** (0.031)
Same Nation	1.310** (0.277)	1.221** (0.280)	1.254** (0.279)
Colonial Relationship	1.832** (0.044)	1.795** (0.044)	1.867** (0.043)
No. of observations	61 013	59 780	61 013
S.E.R.	1,84	1,84	1,84
Adj. R^2	0,63	0,63	0,63

Notes: OLS estimation with (unreported) year effects. White heteroskedastic-consistent standard errors are in parentheses. ** denotes significant at the 1% level. Data sources are described in the text.

Table 3
The Impact of Internal Instability on Trade

Dependent variable: (Log) Bilateral Trade Period: 1960-1993	Coefficient	No. of Observations	S.E.R.	Adj. R^2
(Log Product) 1+Number of Assassinations	-0.160** (0.010)	148 574	2,09	0,63
(Log Product) 1+Average Number of Assassinations, 1960-93	-0.622** (0.014)	163 327	2,06	0,63
(Log Product) 1+Number of Years with at least one Assassination, 1960-93	-0.224** (0.004)	170 725	2,06	0,62
(Log Product) 1+Number of Guerrilla Activities	-0.183** (0.011)	148 574	2,09	0,63
(Log Product) 1+Average Number of Guerrilla Activities, 1960-93	-0.416** (0.018)	163 327	2,07	0,62
(Log Product) 1+Number of Years with at least one Guerrilla Activity, 1960-93	-0.120** (0.004)	170 725	2,07	0,62
(Log Product) 1+Number of Purges	-0.163** (0.014)	148 574	2,09	0,63
(Log Product) 1+Average Number of Purges, 1960-93	-1.021** (0.029)	140 594	1,99	0,65
(Log Product) 1+Number of Years with at least one Purge, 1960-93	-0.229** (0.005)	147 028	1,99	0,64
(Log Product) 1+Number of Riots	-0.091** (0.007)	148 574	2,09	0,63
(Log Product) 1+Average Number of Riots, 1960-93	-0.096** (0.010)	140 594	1,99	0,65
(Log Product) 1+Number of Years with at least one Riot, 1960-93	-0.132** (0.005)	147 028	2,00	0,64
(Log Product) 1+Number of Revolutions	-0.145** (0.016)	148 574	2,09	0,63
(Log Product) 1+Average Number of Revolutions, 1960-93	-0.837** (0.031)	140 594	1,99	0,65
(Log Product) 1+Number of Years with at least one Revolution, 1960-93	-0.219** (0.005)	147 028	1,99	0,65

Notes: OLS estimation with (unreported) year effects. Other regressors not shown in the table: constant, log Distance, log GDPs, log per capita GDPs, Common Language, Common Border, Common Colonizer, Colonial Relationship. White heteroskedastic-consistent standard errors are in parentheses.
** denotes significant at the 1% level. Data sources are described in the text.

Table 4
The Impact of Military Personnel and Defense Expenditures on Trade

Dependent variable: (Log) Bilateral Trade
Period: 1972-1982

(Log Product) Size of Military/Population	-3.637** (0.994)		-15.120** (1.841)
(Log Product) Defense Expenditures/GDP		0.148** (0.011)	0.218** (0.015)
No. of observations	46 105	16 394	13 876
S.E.R.	1,87	1,70	1,62
Adj. R^2	0,64	0,71	0,72

Notes: OLS estimation with (unreported) year effects. Other regressors not shown in the table: constant, log Distance, log GDPs, log per capita GDPs, Common Language, Common Border, Common Colonizer, Colonial Relationship. White heteroskedastic-consistent standard errors are in parentheses. ** denotes significant at the 1% level. Data sources are described in the text.

Table 5
The Impact of War on Trade

Dependent variable: (Log) Bilateral Trade Period: 1960-1985	(1)	(2)	(3)
(Sum Dummy) Participation in at least one External War, 1960-85	-0.338** (0.010)		-0.368** (0.012)
(Log Product) 1+Fraction of Time Involved in External War, 1960-85		-0.395** (0.028)	0.152** (0.034)
No. of observations	95 187	95 187	95 187
S.E.R.	1,80	1,81	1,80
Adj. R^2	0,64	0,64	0,64

Notes: OLS estimation with (unreported) year effects. Other regressors not shown in the table: constant, log Distance, log GDPs, log per capita GDPs, Common Language, Common Border, Common Colonizer, Colonial Relationship. White heteroskedastic-consistent standard errors are in parentheses. ** denotes significant at the 1% level. Data sources are described in the text.

Appendix 1
Descriptive Statistics

Variable	Mnemonic	Period	Sample	Mean	Std. Dev.	Min	Max
(Log Product) 1+Number of Terrorist Actions	TER	1969-78	111 243	1,00	1,16	0,00	7,11
(Sum Dummy) At least one Terrorist Action	TERD	1969-78	76 441	1,58	0,57	0,00	2,00
(Log Product) 1+Total Number of Terrorist Actions	TERT	1969-78	111 243	3,41	2,31	0,00	10,93
(Log Product) Defense Expenditures/GDP	DEF	1972-93	89 684	0,01	0,01	0,00	0,08
(Log Product) Size of Military/Population	MIL	1960-82	35 465	1,67	1,36	-6,00	15,30
(Log Product) 1+Number of Assassinations	ASN	1960-93	178 551	0,21	0,50	0,00	5,97
(Log Product) 1+Average Number of Assassinations	ASNA	1960-93	199 430	0,31	0,34	0,00	2,39
(Log Product) 1+Number of Years with at least one Assassination	ASNY	1960-93	219 315	1,92	1,29	0,00	5,60
(Log Product) 1+Number of Guerrilla Activities	GUE	1960-93	178 551	0,28	0,48	0,00	5,50
(Log Product) 1+Average Number of Guerrilla Activities	GUEA	1960-93	199 430	0,38	0,32	0,00	1,86
(Log Product) 1+Number of Years with at least one Guerrilla Activity	GUEY	1960-93	219 315	2,39	1,63	0,00	6,77
(Log Product) 1+Number of Purges	PUR	1960-93	178 551	0,14	0,38	0,00	5,16
(Log Product) 1+Average Number of Purges	PURA	1960-93	174 011	0,22	0,19	0,00	1,42
(Log Product) 1+Number of Years with at least one Purge	PURY	1960-93	191 622	1,80	1,20	0,00	5,12
(Log Product) 1+Number of Riots	RIO	1960-93	178 551	0,49	0,79	0,00	7,43
(Log Product) 1+Average Number of Riots	RIOA	1960-93	174 011	0,71	0,62	0,00	4,23
(Log Product) 1+Number of Years with at least one Riot	RIOY	1960-93	191 622	2,92	1,39	0,00	6,77
(Log Product) 1+Number of Revolutions	REV	1960-93	178 551	0,20	0,38	0,00	2,89
(Log Product) 1+Average Number of Revolutions	REVA	1960-93	174 011	0,25	0,22	0,00	2,35
(Log Product) 1+Number of Years with at least one Revolution	REVY	1960-93	191 622	2,05	1,36	0,00	6,04
(Sum Dummy) Participation in at least one External War	WARD	1960-85	137 570	0,75	0,68	0,00	2,00
(Log Product) 1+Fraction of Time Involved in External War	WART	1960-85	137 570	0,15	0,23	0,00	2,00
(Log of) Bilateral Trade	TRAD	1960-93	319 944	10,67	3,70	-16,12	23,67
(Log of) Distance	DIST	1960-93	235 552	8,14	0,83	3,68	9,42
(Log of) Real GDP	GDP	1960-93	174 716	47,82	2,67	35,39	57,49
(Log of) Real GDP per capita	GDPC	1960-93	174 716	16,06	1,44	11,52	20,90
Common Border Dummy	BORD	1960-93	319 944	0,02	0,14	0,00	1,00
Common Language Dummy	LANG	1960-93	319 944	0,16	0,37	0,00	1,00
Common Colonizer Dummy	COL	1960-93	319 944	0,07	0,25	0,00	1,00
Colony Dummy	CLNY	1960-93	319 944	0,02	0,12	0,00	1,00

Appendix 2

Simple Bivariate Correlations

	TER	TERD	TERT	DEF	MIL	ASN	ASNA	ASNY	GUE	GUEA	GUEY	PUR	PURA	PURY	RIO	RIOA	RIOY	REV	REVA	REVY	WARD	WART	TRAD	DIST	GDP	GDPC	BORD	LANG	COL	CLNY
TER	1,00																													
TERD	0,23	1,00																												
TERT	0,80	0,49	1,00																											
DEF	0,13	0,14	0,17	1,00																										
MIL	0,19	0,23	0,31	0,50	1,00																									
ASN	0,18	0,09	0,29	0,01	0,04	1,00																								
ASNA	0,27	0,18	0,49	-0,02	0,02	0,51	1,00																							
ASNY	0,31	0,21	0,51	0,15	0,13	0,38	0,82	1,00																						
GUE	0,26	0,15	0,24	0,10	-0,04	0,34	0,36	0,30	1,00																					
GUEA	0,19	0,24	0,38	0,14	-0,02	0,28	0,62	0,65	0,52	1,00																				
GUEY	0,19	0,26	0,33	0,19	0,04	0,28	0,57	0,67	0,52	0,91	1,00																			
PUR	0,10	0,02	-0,02	0,12	0,12	0,06	0,08	0,14	0,16	0,13	0,13	1,00																		
PURA	0,02	0,14	0,07	0,25	0,18	0,14	0,30	0,45	0,14	0,50	0,45	0,39	1,00																	
PURY	0,00	0,08	0,02	0,17	0,08	0,19	0,38	0,47	0,25	0,59	0,59	0,32	0,87	1,00																
RIO	0,17	0,08	0,17	0,06	0,07	0,31	0,42	0,41	0,30	0,38	0,35	0,19	0,26	0,28	1,00															
RIOA	0,28	0,16	0,42	0,20	0,15	0,28	0,60	0,74	0,23	0,59	0,58	0,15	0,40	0,35	0,48	1,00														
RIOY	0,24	0,16	0,42	0,16	0,16	0,27	0,59	0,76	0,27	0,65	0,70	0,19	0,56	0,58	0,44	0,82	1,00													
REV	0,05	-0,06	0,00	0,14	0,02	0,26	0,08	0,09	0,38	0,23	0,23	0,39	0,23	0,24	0,18	0,07	0,11	1,00												
REVA	0,02	-0,06	-0,05	0,25	-0,06	0,08	0,24	0,33	0,35	0,58	0,61	0,20	0,47	0,52	0,19	0,23	0,35	0,38	1,00											
REVY	0,02	-0,14	-0,09	0,25	-0,02	0,12	0,27	0,38	0,35	0,60	0,66	0,21	0,50	0,58	0,26	0,29	0,43	0,37	0,93	1,00										
WARD	0,09	0,12	0,10	0,38	0,15	0,04	0,27	0,45	0,17	0,46	0,52	0,12	0,40	0,45	0,16	0,32	0,35	0,18	0,56	0,59	1,00									
WART	0,12	0,11	0,18	0,26	0,01	0,10	0,15	0,19	0,24	0,33	0,33	0,14	0,23	0,20	0,01	0,10	0,06	0,26	0,46	0,34	0,50	1,00								
TRAD	0,30	0,32	0,58	0,08	0,15	0,17	0,19	0,13	0,05	0,05	0,01	-0,06	-0,06	-0,13	0,11	0,31	0,19	-0,08	-0,26	-0,29	-0,19	-0,11	1,00							
DIST	-0,06	0,07	-0,04	-0,04	-0,11	-0,05	0,05	0,13	0,00	0,08	0,14	0,04	0,05	0,09	-0,01	0,08	0,11	-0,02	0,02	0,01	0,06	-0,02	-0,28	1,00						
GDP	0,34	0,41	0,70	0,06	0,06	0,23	0,38	0,36	0,15	0,29	0,25	-0,02	0,13	0,08	0,24	0,56	0,46	-0,05	-0,12	-0,14	-0,05	-0,04	0,77	0,01	1,00					
GDPC	0,21	0,37	0,53	-0,10	0,30	0,06	0,03	-0,06	-0,14	-0,29	-0,30	-0,15	-0,31	-0,39	-0,10	-0,05	-0,09	-0,24	-0,58	-0,62	-0,49	-0,31	0,61	-0,05	0,53	1,00				
BORD	0,02	-0,01	0,01	-0,03	-0,06	0,01	-0,01	-0,04	0,01	0,00	-0,02	-0,03	-0,03	-0,01	0,01	0,01	-0,04	0,00	-0,03	-0,04	-0,03	-0,04	0,16	-0,44	0,06	-0,01	1,00			
LANG	-0,04	-0,16	-0,12	0,09	0,00	-0,04	-0,05	0,02	-0,06	-0,07	-0,03	-0,01	-0,07	-0,12	0,03	0,09	0,00	-0,03	-0,01	0,01	0,03	-0,05	0,02	-0,04	-0,06	-0,08	0,09	1,00		
COL	-0,11	-0,07	-0,19	0,06	0,03	-0,06	-0,06	-0,02	-0,01	0,05	0,04	-0,05	-0,05	-0,04	0,03	0,01	-0,07	-0,04	0,02	0,07	0,12	0,00	-0,15	-0,13	-0,25	-0,22	0,07	0,22	1,00	
CLNY	0,12	0,03	0,15	0,00	-0,01	0,10	0,14	0,16	0,13	0,14	0,14	-0,03	-0,02	-0,01	0,11	0,13	0,14	0,03	0,05	0,07	-0,07	-0,05	0,17	0,00	0,13	0,07	0,01	0,26	-0,04	1,00